UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/782,158	02/14/2001	Masayuki Orihashi	P20624	8318

7055 7590 08/20/2004

GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

EXAMINER	
PERILLA, JASON M	

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 08/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/782,158	ORIHASHI ET AL.	
	Examiner	Art Unit	
	Jason M Perilla	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-8,11-13 and 18-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-8,11-13 and 18-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 February 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 6-8, 11-13, and 18-23 are pending in the instant application.

Response to Arguments/Amendments

2. Applicant's arguments with respect to claims 6-8, 11-13 and 18-23 have been considered but are moot in view of new ground(s) of rejection.

3. The indicated allowability of claims 6-8, 11-13, 18, and 19 in the office action dated March 29, 2004 are withdrawn in view of the reconsideration of the previously cited reference Okazaki (US 6687290). New rejections based on the reference follow.

Claim Objections

4. Claims 6-8, 11-13, and 18-23 objected to because of the following informalities:

Regarding claim 6, the claim recites, "A radio reception apparatus, comprising a correlation calculator that performs a correlation calculation on a reception signal with a calculation length using a known signal", but it is suggested that the claim should begin as, --A radio reception apparatus, comprising a correlation calculator that performs a correlation calculation having a calculation length on a reception signal ~~with a calculation length~~ using a known signal— because the modifier "with a calculation length" is thereby specifically referencing the length of the correlation calculation itself rather than possibly the reception signal.

Regarding claims 21 and 23, the language, "further comprising further controlling" in line 2 should be replaced by –further comprising controlling— for the clarity of the claim language.

Regarding claims 11, 18 and 19, the same objection is made with respect to the position of the phrase "with a calculation length" as applied to claim 6 above.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 6-8, 11-13, and 18-23 rejected under 35 U.S.C. 103(a) as being unpatentable over Komatsu (US 5818882 – previously cited) in view of Okazaki (US 6687290 – previously cited).

Regarding claim 1, Komatsu discloses a radio reception apparatus (fig. 3; col. 2, lines 59-62) comprising: correlation calculating means (fig. 3, refs. 4a-n; col. 5, lines 55-67; col. 7, lines 9-18) for performing correlation calculation on a reception signal with a predetermined calculation length (inherent) using a known signal (col. 5, line 61 - "spread code"); delay detecting means (figs. 3 and 4, refs. 5a-n; col. 6, lines 3-15) for performing delay detection using the signal after said correlation calculation (col. 7, lines 18-26); and detecting means for detecting synchronization timing from the delay detection output (fig. 3, ref. 7; fig. 4, refs. 20-22; col. 6, lines 32-35). The synchronization timing is the output of the multiplier 22 of figure 5 and it represents the detection of phase shifting between the known signal 20 and the output of the delay detector 6. Further, Komatsu discloses a frequency estimator (fig. 5, refs. 28-30) that

estimates a frequency component (angle/vector) included in a signal obtained from the delay detection (fig. 5 – output of multiplier 22; col. 6, lines 40-55). The frequency estimator estimates a frequency component or angle/vector deviation and uses it to compute a frequency offset vector normalized over the number of symbols integrated. Komatsu does not disclose a calculation length controller that controls the calculation length of the correlator based on the frequency component estimated by the frequency estimator. However, Okazaki discloses an automatic frequency control method which uses a known sequence in a reception signal to find an amount of phase shift across a correlation of the known sequence for correction of a deviation in frequency between a transmitter and a receiver (col. 1, lines 35-68). Further, Okazaki teaches that the correlation length of the known sequence can be adaptively adjusted to balance the precision of the frequency correction with the power used by the system (col. 2, lines 53-65) and proposes an apparatus having an adjustable correlation length (col. 4, lines 10-30; col. 8, lines 10-40). Okazaki presents an illustration of a shorter overall correlation length in figure 7 as compared to that of figure 8 which has a longer overall correlation length and teaches that the longer correlation length of figure 8 provides suppression of noise wherein a small magnitude of frequency deviation can be reliably detected, albeit at the cost of power (col. 9, lines 40-60). One of ordinary skill in the art would thereby be motivated to utilize a calculation length controller to control the calculation length of the correlation based upon the frequency component (offset) estimated by the frequency estimator. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a

calculation length controller as suggested by Okazaki in the apparatus of Komatsu because a proper balance could be obtained between power consumption and accurate frequency deviation correction.

Regarding claim 7, Komatsu in view of Okazaki disclose the limitations of claim 6 as applied above. Further, Okazaki discloses that the calculation length controller increases the calculation length as the frequency estimated by the frequency estimator approximates to a target frequency (col. 9, lines 53-56). Okazaki discloses that in the case where the fluctuation of the channel that includes the frequency deviation is small in magnitude or close to a target frequency, the longer correlation length has the effect of suppressing noises obtained in the reception signal.

Regarding claim 8, Komatsu in view of Okazaki disclose the limitations of claim 6 as applied above. Further, Okazaki discloses that the calculation length controller increases the calculation length as the frequency estimated by the frequency estimator approximates to a target frequency or, equivalently, the number of times a synchronization timing is detected (col. 9, lines 53-56). Okazaki discloses that in the case where the fluctuation of the channel that includes the frequency deviation is small in magnitude or a synchronization timing is closely detected, a longer correlation length has the effect of suppressing noises obtained in the reception signal. It is obvious to one having ordinary skill in the art to adjust the correlation length according the synchronization timing because if a synchronization timing is detected often (close to synchronization), the added correlation length could advantageously be utilized to suppress noise and more accurately correct the frequency deviation.

Regarding claim 11, Komatsu discloses a radio reception apparatus (fig. 3; col. 2, lines 59-62) comprising: correlation calculating means (fig. 3, refs. 4a-n; col. 5, lines 55-67; col. 7, lines 9-18) for performing correlation calculation on a reception signal with a predetermined calculation length (inherent) using a known signal (col. 5, line 61 - "spread code"); delay detecting means (figs. 3 and 4, refs. 5a-n; col. 6, lines 3-15) for performing delay detection using the signal after said correlation calculation (col. 7, lines 18-26); and detecting means for detecting synchronization timing from the delay detection output (fig. 3, ref. 7; fig. 4, refs. 20-22; col. 6, lines 32-35). The synchronization timing is the output of the multiplier 22 of figure 5 and it represents the detection of phase shifting between the known signal 20 and the output of the delay detector 6. Further, Komatsu discloses a reception situation estimator (fig. 5, refs. 28-30) that estimates a reception situation (angle/vector) from the reception signal (fig. 5 – output of multiplier 22; col. 6, lines 40-55). The reception situation estimator estimates a frequency component or angle/vector deviation and uses it to compute a frequency offset vector normalized over the number of symbols integrated. Komatsu does not disclose a calculation length controller that controls the calculation length of the correlator based on the reception situation estimated by the reception situation estimator. However, Okazaki discloses an automatic frequency control method which uses a known sequence in a reception signal to find an amount of phase shift across a correlation of the known sequence for correction of a deviation in frequency between a transmitter and a receiver (col. 1, lines 35-68). Further, Okazaki teaches that the correlation length of the known sequence can be adaptively adjusted to balance the

precision of the frequency correction with the power used by the system (col. 2, lines 53-65) and proposes an apparatus having an adjustable correlation length (col. 4, lines 10-30; col. 8, lines 10-40). Okazaki presents an illustration of a shorter overall correlation length in figure 7 as compared to that of figure 8 which has a longer overall correlation length and teaches that the longer correlation length of figure 8 provides suppression of noise wherein a small magnitude of frequency deviation can be reliably detected, albeit at the cost of power (col. 9, lines 40-60). One of ordinary skill in the art would thereby be motivated to utilize a calculation length controller to control the calculation length of the correlation based upon the reception situation (frequency offset) estimated by the reception situation estimator. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize a calculation length controller as suggested by Okazaki in the apparatus of Komatsu because a proper balance could be obtained between power consumption and accurate frequency deviation correction.

Regarding claim 12, Komatsu in view of Okazaki disclose the limitations of claim 11 as applied above. Further, according to the teachings of Okazaki, it would be obvious that the calculation length controller would increase the calculation length when the reception situation is bad and would decrease the calculation length when the reception situation is good (col. 9, lines 53-56). Okazaki discloses that in the case where the fluctuation of the channel that includes the frequency deviation is small in magnitude or close to a target frequency, the longer correlation length has the effect of suppressing noises obtained in the reception signal. Therefore, it is known by the

teachings of Okazaki that the longer correlation length adjusted by the correlation controller would have the effect of noise suppression for bad or noisy channels. Alternatively, in the case where less noise is found in the reception signal or a good reception situation, the correlation controller could shorten the correlation length to save system power.

Regarding claim 13, Komatsu in view of Okazaki disclose the limitations of claim 11 as applied above. Further, Okazaki discloses that the calculation length controller increases the calculation length as the frequency estimated by the frequency estimator approximates to a target frequency or, equivalently, the number of times a synchronization timing is detected (col. 9, lines 53-56). Okazaki discloses that in the case where the fluctuation of the channel that includes the frequency deviation is small in magnitude or a synchronization timing is closely detected, a longer correlation length has the effect of suppressing noises obtained in the reception signal. It is obvious to one having ordinary skill in the art to adjust the correlation length according the synchronization timing because if a synchronization timing is detected often (close to synchronization), the added correlation length could advantageously be utilized to suppress noise and more accurately correct the frequency deviation.

Regarding claims 18, 20, and 21, the limitations of the claims are disclosed by Komatsu in view of Okazaki as applied to claims 6-8, respectively, above.

Regarding claims 19, 22, and 23, the limitations of the claims are disclosed by Komatsu in view of Okazaki as applied to claims 11-13, respectively, above.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art of record not relied upon above is further cited to show the current state of the art with respect to automatic frequency correction systems and methods.

U.S. Pat. No. 5422917 to Scott.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (703) 305-0374. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMPerilla

Jason M. Perilla
August 10, 2004

jmp

CHIEH M. FAN
PRIMARY EXAMINER